HL Paper 1

Which statement about water is correct?

A. The atoms within a molecule of water are held together by hydrogen bonds.
B. Water has a low heat capacity allowing enzymatic reactions to happen at a wide range of temperatures.
C. Water molecules are polar, therefore fatty acids do not dissolve.
D. Ice has a higher density than liquid water, therefore some organisms can live under the ice.

Markscheme

C

Examiners report

This question discriminated well. However, many candidates went for the incorrect choice, A. This showed a lack of understanding of covalent bonds and hydrogen bonds. The requirement for candidates to know that fatty acids do not dissolve in water because it is polar was questioned in a G2. This would be covered in 3.1.5 under solvent properties of water, 3.2.7 under use of lipids in energy storage and again in 2.4.2 when explaining hydrophobic in relation to phospholipids.

Which statements correctly explain properties of water?

I. Water is a useful medium for metabolic reactions as many substances dissolve in water.
II. Water is useful as a coolant as it takes a small amount of heat energy to change its temperature.
III. Water molecules are cohesive which helps water transport in the roots and stems of plants.

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

Markscheme

B

Examiners report

N/A

What is involved during oxidation?

A. The loss of electrons
B. The gain of electrons
C. The gain of hydrogen
D. The loss of oxygen

Markscheme

A

Examiners report

N/A

What property of water makes it suitable as a coolant?

A. It takes a lot of energy to increase the temperature of water.

B. It takes a lot of energy for water to evaporate.

C. Water molecules are cohesive and stick to the skin.

D. Water is a good solvent so it can transport heat from the body.

Markscheme

B

Examiners report

This question also elicited some criticisms from teachers, who felt that there were two correct answers. Water cools living organisms when it evaporates so B was the correct answer. Water does conduct heat away from active muscles when blood flows through them and the heat is lost to the environment when the blood passes to the skin, but this can be regarded as a means of redistributing heat in organisms rather than actual cooling.

What is formed from glucose during anaerobic cell respiration?

A. Lactate and ATP in cytoplasm
B. Carbon dioxide and water in mitochondria
C. Lactate and carbon dioxide in mitochondria
D. Carbon dioxide and water in cytoplasm

Markscheme

A

Examiners report

N/A

Why is light important in photosynthesis?

A. To produce ATP and split water molecules
B. To produce ADP needed to fix carbon dioxide
C. To activate the enzymes that fix carbon dioxide
D. To activate carbon dioxide molecules

Markscheme

A

Examiners report

N/A

Which molecules are monosaccharides?

A. starch, glycogen, cellulose
B. sucrose, maltose, lactose
C. fructose, glucose, galactose
D. glucose, lactose, cellulose

Markscheme

C

Examiners report

N/A

What is light energy used for during photosynthesis?

A. To produce carbon dioxide
B. To produce water molecules
C. To produce ATP
D. To break down sugar molecules

Markscheme

C

Examiners report

N/A

Which sugars are examples of a monosaccharide and disaccharide?

	Monosaccharide	Disaccharide
A.	fructose	galactose
B.	lactose	maltose
C.	sucrose	fructose
D.	galactose	lactose

Markscheme

D

Examiners report

[N/A]

Which of the following statements is/are correct for DNA replication?

I. It occurs during interphase.
II. It is semi-conservative.
III. It is a stage in protein synthesis.

A. I only
B. II only
C. I and II only
D. I, II and III

Markscheme

C

Examiners report

N/A

What happens during the pathway of glycolysis?

A. Glucose is broken down into pyruvate.
B. Carbon dioxide is produced.
C. More ATP is consumed than is produced.
D. Lactic acid is produced.

Markscheme

A

Examiners report

N/A

If 15 % of a sample of DNA is thymine, what percentage of the DNA is guanine?

A. 15 %
B. 30 %
C. 35 %
D. It cannot be determined from the information given.

Markscheme

C

Examiners report

N/A

Which of the following processes uses DNA ligase?

A. Unwinding DNA
B. Gene transfer using plasmids
C. Adding primers
D. Complementary base pairing

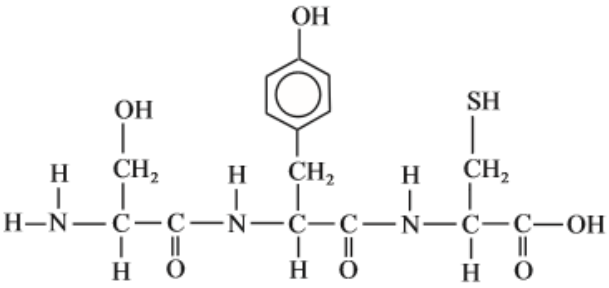
Markscheme

B

Examiners report

This question raised some issues in the G2s about lack of clarity. The phrase gene transfer could have confused the candidates; probably genetic modification would have been a better choice for it.

Which type of molecule is shown in the diagram below?



A. Peptide
B. Carbohydrate
C. Lipid
D. Nucleic acid

Markscheme

A

Examiners report

This question discriminated well but many candidates found this difficult. Candidates did not seem to recognize the amino acids connected by the peptide bonds. Perhaps they were distracted by the real side groups indicated rather than simply “R”.

What is the energy absorbed by chlorophyll used directly for in plants?

I. To produce ATP
II. To split water
III. To fix CO_2

A. I only
B. III only
C. I and II only
D. II and III only

Markscheme

C

Examiners report

This was a multiple completion question. This type of question needs to be constructed carefully and thought about very carefully by candidates. In this case answers B and D could be eliminated because the energy absorbed by chlorophyll is not used to fix CO_2 directly, it must be used to produce to ATP first. The only question was then whether splitting of water is a direct use of energy absorbed by chlorophyll. The expected view was that it is, as water is not split unless excited electrons have been given away by chlorophyll in Photosystem II. An illustration of this is the rapidity with which pondweed stops producing bubbles of oxygen when light intensity is reduced.

What happens during translation?

A. Copying of DNA to produce DNA

B. Copying of DNA to produce mRNA

C. Copying of DNA to produce tRNA

D. Polypeptide synthesis

Markscheme

D

Examiners report

[N/A]

Which molecule is a polysaccharide?

A. Glucagon
B. Glucose
C. Glycerol
D. Glycogen

Markscheme

D

Examiners report

A very good discriminator, where only the capable candidates recognized glycogen as a polysaccharide.

Why does exposure to high temperatures cause an enzyme to lose its biological properties?

A. The substrate blocks the active site at high temperatures.

B. The three dimensional structure of the enzyme becomes changed.

C. Chemical reactions cannot take place at high temperatures.

D. High temperatures increase the activation energy of reactions.

Markscheme

B

Examiners report

[N/A]

On which molecule is a codon found?

A. DNA
B. mRNA
C. tRNA
D. rRNA

Markscheme

B

Examiners report

Both A and B were accepted as the correct answer.

Blood is a water-based transport medium. Which property of water makes it a good transport medium?

A. High specific heat
B. Transparency
C. Versatility as a solvent
D. It has its greatest density at 4°C

Markscheme

C

Examiners report

Although there were some complaints about the wording of this question, it also proved to be a very easy question.

Glucose is absorbed through protein channels in the plasma membrane of epithelium cells in the small intestine. Which characteristics of glucose prevent its diffusion through the phospholipid bilayer?

A. It is non-polar and therefore hydrophobic.

B. Its hydrogen bonds link with amino acids in the protein channel.

C. It is polar and therefore hydrophilic.

D. Its covalent bonds interact with the phospholipids.

Markscheme

C

Examiners report

[N/A]

What occurs during DNA replication?

A. DNA polymerase separates the two DNA strands.
B. DNA molecules containing nucleotides from the original molecule are produced.
C. Adenine forms a base pair with either thymine or uracil.
D. New bases attach to the original sugar-phosphate backbone.

Markscheme

B

Examiners report

Question 8 was answered relatively poorly by candidates. There was a concern expressed by some teachers that C was a correct answer because RNA primers formed during DNA replication have uracil paired with adenine in the template DNA strand. In fact this was the least popular answer and candidates can reasonably have been expected to choose answer B as the best response. Substantial numbers of candidates chose A and D, showing weak understanding of replication.

Which carbohydrates are used to provide energy storage in plants and animals?

	Plants	Animals
A.	starch	glucose
B.	cellulose	glycogen
C.	starch	glycogen
D.	maltose	glucose

Markscheme

C

Examiners report

N/A

Which of the following statements is **true** about enzymes?

A. They are used up in the reactions they catalyse.
B. Allosteric inhibitors bind to the active site.
C. They lower the energy of activation for a reaction.
D. They supply the energy of activation for a reaction.

Markscheme

C

Examiners report

This question seemed to be easy, but was also a good discriminator.

What are the **most** frequently occurring elements in living organisms?

A. calcium, phosphorus, iron and sodium
B. calcium, sodium, nitrogen and phosphorus
C. carbon, phosphorus, oxygen and nitrogen
D. nitrogen, carbon, oxygen and hydrogen

Markscheme

D

Examiners report

N/A

Which sugars are both disaccharides?

A. maltose and lactose
B. lactose and fructose
C. fructose and galactose
D. galactose and maltose

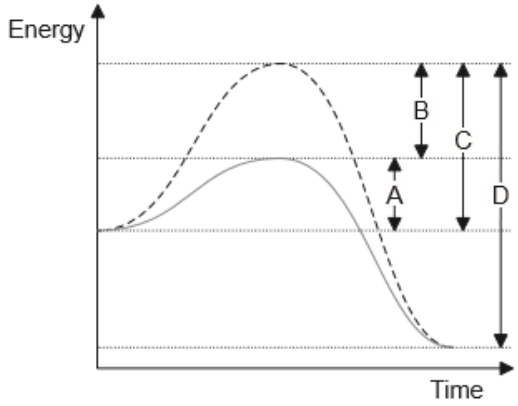
Markscheme

A

Examiners report

Question 7 discriminated effectively between the stronger and weaker candidates, but the question was criticised by teachers for testing a small piece of factual knowledge. The curriculum review currently underway is responding to this by increasing the emphasis on understanding and reducing the emphasis on memorisation of specific facts.

Which is the activation energy of a reaction when it is catalysed by an enzyme?



Markscheme

A

Examiners report

N/A

The base sequence of a fragment of DNA is:

ACC GTG CAG GAT

What is the base sequence on the messenger RNA (mRNA) molecule transcribed from it?

A. TGG CAC GTC CTA
B. TGG CUC GTC CTU
C. UGG CTC GUC CUT
D. UGG CAC GUC CUA

Markscheme

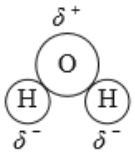
D

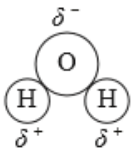
Examiners report

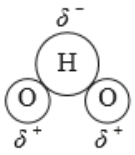
Questions 7, 8, 10, 11 and 12 also had relatively low discrimination indices because a high proportion of candidates answered them correctly,

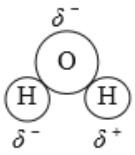
indicating either good knowledge or that these questions proved to be rather too easy.

Which diagram represents the polarity of a water molecule?

A. 

B. 

C. 

D. 

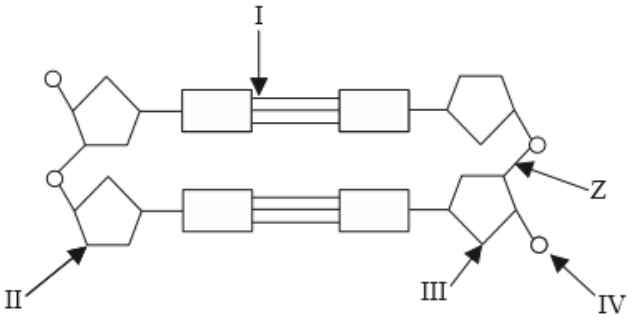
Markscheme

B

Examiners report

N/A

This question refers to the following DNA diagram.



Which points to the 3′ end of a strand of DNA?

A. I
B. II
C. III
D. IV

Markscheme

B

Examiners report

N/A

Why is sweat a good coolant for the body?

A. The arterioles that transfer water to sweat move closer to the skin surface when it is hot.
B. Breaking H bonds between water molecules in sweat requires energy from body heat.
C. Sweat contains minerals such as sodium chloride.
D. Sweat is non-polar.

Markscheme

B

Examiners report

This question was a good discriminator; good candidates had the right answer while weaker candidates did not realize that it is the breaking of the H bonds between water molecules that makes it a good coolant.

A channel protein is used to transport ions across a membrane. What would you expect to find lining the inside of the channel?

A. Phospholipids
B. Non-polar amino acids
C. Fatty acids
D. Polar amino acids

Markscheme

D

Examiners report

Question 26 was answered correctly by fewer candidates than expected. Channel proteins are needed for facilitated diffusion of charged and polar substances, so polar amino acids can be expected to line their pores

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What is phosphorus used for in plant cells?

A. Structure of hemoglobin
B. Composition of long-term energy storage
C. Positive charge of membranes
D. Composition of nucleic acids

Markscheme

D

Examiners report

N/A

Organisms can be genetically modified to produce the human blood clotting factor IX. What characteristic of the genetic code makes this possible?

A. It is conservative.
B. It is degenerate.
C. It is complementary.
D. It is universal

Markscheme

D

Examiners report

N/A

Which of the following is **true** about a polar amino acid and cellulose?

A. Both are polysaccharides.
B. Both contain nitrogen.
C. Both are hydrophobic.
D. Both contain hydrogen atoms.

Markscheme

D

Examiners report

Candidates had to know that cellulose is a polysaccharide and that these contain hydrogen in their structure. The structure of polar amino acids had to be known too.

Which can be explained by the solvent properties of water?

A. Sodium chloride is transported as Na^+ and Cl^- in blood.

B. Movement of water occurs under tension in the xylem.

C. Water is the coolant in sweat.

D. Ice floats on liquid water.

Markscheme

A

Examiners report

[N/A]

What principle is necessary to prevent mutation of DNA during replication?

A. Base pairing is complementary.

B. One gene codes for one polypeptide.

C. Substrates are specific to enzymes.

D. The genetic code is universal.

Markscheme

A

Examiners report

This question was well answered by most of the candidates, especially the better ones. It would have been better to say that base pairing preserves the sequence rather than prevents mutation of DNA.

How is oxygen produced during photosynthesis?

A. Water molecules are split with energy from ATP.
B. Water molecules are split with energy from light.
C. Carbon dioxide molecules are split with energy from ATP.
D. Carbon dioxide molecules are split with energy from light.

Markscheme

B

Examiners report

N/A

What is decreased when lactase is added to milk?

A. Sweetness

B. Disaccharides

C. Calcium

D. Monosaccharides

Markscheme

B

Examiners report

[N/A]

In cell respiration, what is the name of the process where glucose is broken down into pyruvate?

A. Electron transport chain
B. Krebs cycle
C. Link reaction
D. Glycolysis

Markscheme

D

Examiners report

Questions 7, 8, 10, 11 and 12 also had relatively low discrimination indices because a high proportion of candidates answered them correctly, indicating either good knowledge or that these questions proved to be rather too easy.

A base substitution in a gene has changed a codon. Which of these consequences could result from a base substitution in a codon?

I. Another amino acid will be incorporated in the protein
II. A stop codon is generated
III. The same protein will be synthesized

A. I only
B. I and II only
C. I and III only
D. I, II and III

Markscheme

D

Examiners report

A multi-part question which proved to be a very good discriminator, with just over one third giving the correct answer of D. The crucial expression in the question is ‘could result’ and many went for A as option I was the most obvious.

What is produced when the enzyme lactase is added to milk?

A. Glucose and galactose
B. Lactose
C. Glucose and fructose
D. Lactic acid

Markscheme

A

Examiners report

In contrast Questions 9, 24, 28 and 32 had very high discrimination indices. Each required secure knowledge the details of HL Biology, which diligent and capable students acquire but others tend not to.

It is possible to attach β-galactosidase to alginate beads for use in the production of lactose-free milk. What are enzymes that have been attached in this way called?

A. Inhibited
B. Immobilized
C. Catalysed
D. Activated

Markscheme

B

Examiners report

[N/A]

What happens in both respiration and photosynthesis?

A. Triose phosphates are decarboxylated.
B. NADPH is produced.
C. ATP is produced.
D. Electrons pass through ATP synthase.

Markscheme

C

Examiners report

Some candidates wrongly believed that triose phosphates are produced in both photosynthesis and respiration; while others also got the wrong idea that electrons pass through ATP synthase. This question was a very good discriminator.

For what purpose is the enzyme lactase useful?

A. Production of lactose-free milk so that more people can consume dairy products
B. As a dietary supplement to aid in protein digestion of milk
C. For use in coagulating milk protein to make cheese
D. To improve protein consumption in developing countries that lack milk

Markscheme

A

Examiners report

N/A

Which of the following are involved in **both** replication and transcription?

A. DNA only
B. DNA and RNA
C. DNA and ribosomes
D. DNA, RNA and ribosomes

Markscheme

B

Examiners report

There were some comments on this question. At first A seems correct but many candidates also answered B. They were thinking of the RNA primers at the start of replication. Both answers were accepted.

The percentage of thymine in the DNA of an organism is approximately 30 %. What is the percentage of guanine?

A. 70 %
B. 30 %
C. 40 %
D. 20 %

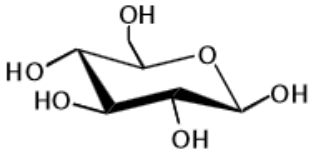
Markscheme

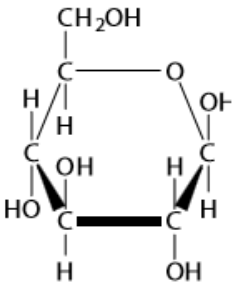
D

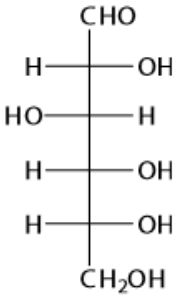
Examiners report

N/A

The diagrams show three representations of the structure of the **same** chemical substance.







What chemical substance is shown?

A. Ribose
B. Glucose
C. Fatty acid
D. Amino acid

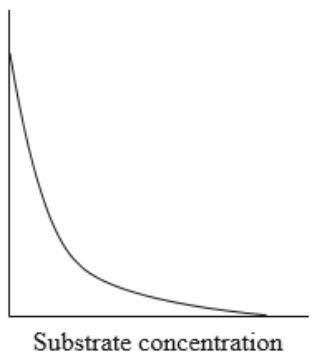
Markscheme

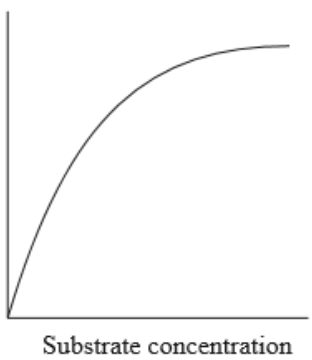
B

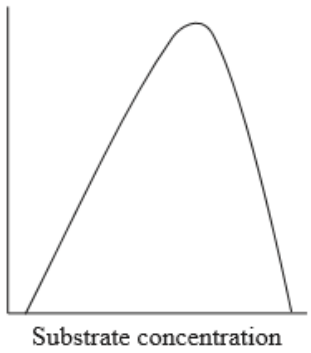
Examiners report

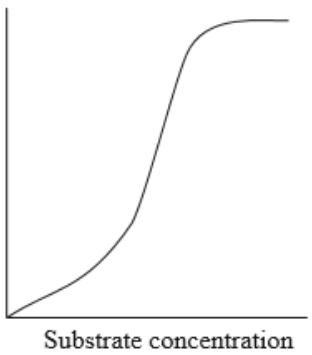
There were some suggestions from teachers that candidates could not be expected to understand the molecular diagrams included here, but nearly 85% of candidates identified the compound correctly as glucose. The commonest wrong answer was ribose, perhaps because candidates counted five carbon atoms in the ring and forgot the sixth carbon attached to C_5.

Which graph shows the effect of increasing the substrate concentration on enzyme activity?

A. 

B. 

C. 

D. 

Markscheme

B

Examiners report

N/A

What is required to replicate DNA?

A. Temperature of 37 °C

B. Free nucleotides carrying A, C, G and T bases

C. Plasmids

D. Endonuclease

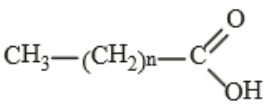
Markscheme

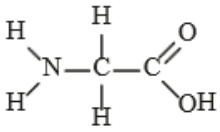
B

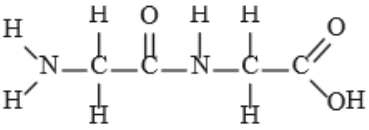
Examiners report

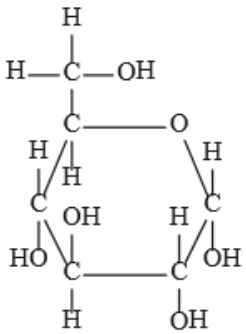
[N/A]

Which structure represents a fatty acid?

A. 

B. 

C. 

D. 

Markscheme

A

Examiners report

N/A

Where are proteins synthesized by free ribosomes used?

A. Outside the cell after secretion
B. Within the nucleus
C. Within the lysosomes
D. Within the cytoplasm

Markscheme

D

Examiners report

Some proteins synthesized in the free ribosomes will be used in the nucleus (for example polymerases), but these are only a few, most of them are used in the cytoplasm, therefore C is the best answer.

What is the source of the oxygen released into the air as a product of photosynthesis?

A. Chlorophyll
B. Carbon dioxide only
C. Water only
D. Both water and carbon dioxide

Markscheme

C

Examiners report

While this question was a good discriminator and was answered correctly by the more able candidates, it was worrying that so many incorrectly chose D. The weaker candidates answered that both water and carbon dioxide are sources of the oxygen produced by photosynthesis indicating that this had not been taught thoroughly.

Which gas produces most of the bubbles in bread dough?

A. Oxygen
B. Methane
C. Carbon dioxide
D. Water vapour

Markscheme

C

Examiners report

Was a good discriminator and was testing a topic of the nature of science (NoS) section.

This reaction is a step in anaerobic cell respiration in a yeast cell.

What are the products of this reaction?

	I	II
A.	oxygen	methanol
B.	carbon dioxide	ethanol
C.	hydrogen	glucose
D.	ADP	phosphate

Markscheme

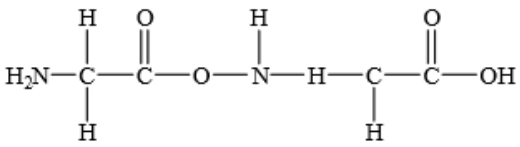
B

Examiners report

[N/A]

Which molecular structure correctly illustrates two amino acids linked by a peptide bond?

A.



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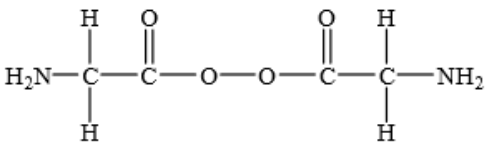

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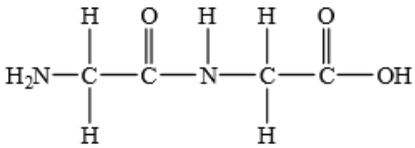

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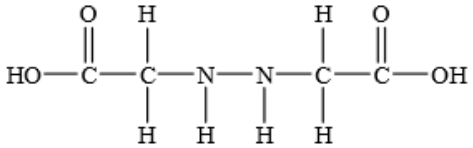


Markscheme

C

Examiners report

N/A

Olive oil may reduce the risk of coronary heart disease. What is/are the compound(s) responsible for the health benefits of olive oil?

I. Cis unsaturated fatty acids
II. Trans unsaturated fatty acids
III. Saturated fatty acids

A. I only
B. I and II only
C. II and III only
D. I, II and III

Markscheme

A

Examiners report

[N/A]

What is the relationship between enzymes and DNA?

A. Enzymes contain the code for DNA.
B. Enzymes act on DNA during translation.
C. Both enzymes and DNA have similar shapes.
D. The structure of enzymes is determined by DNA.

Markscheme

D

Examiners report

N/A

Which statement describes glycogen?

A. It is a hormone involved in the control of blood glucose.
B. It is a component of the cell wall in plants.
C. It is a monosaccharide converted to pyruvate during cell respiration.
D. It is a polysaccharide found in animals.

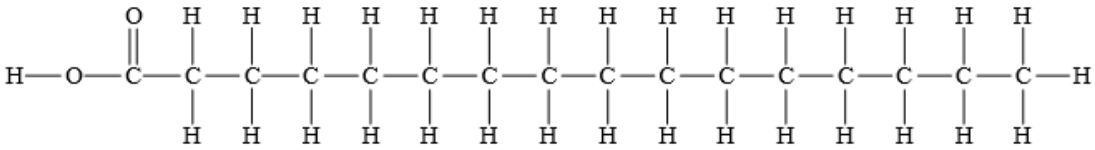
Markscheme

D

Examiners report

Many candidates had this question wrong and chose answer A instead of D. The most probable reason is they confused the word glycogen for glucagon. This proved to be a good discriminator.

What substance is represented by this structure?



A. Glycerol
B. Fatty acid
C. Cellulose
D. Glycogen

Markscheme

B

Examiners report

N/A

How can the rate of photosynthesis be measured?

I. By the amount of oxygen produced

II. By the increase in biomass

III. By the amount of carbon dioxide produced

A. I only
B. I and II only
C. I and III only
D. I, II and III

Markscheme

B

Examiners report

The answers to the question do not reflect a measurement of a rate of reaction, as time is not included. As none of the answers include the time, it is implied in the question.

What usually distinguishes DNA from RNA?

	DNA	RNA
A.	strands are symmetrical	strands are antiparallel
B.	contains adenine	contains cytosine
C.	pentoses linked to phosphates	pentoses linked to bases
D.	double stranded	single stranded

Markscheme

D

Examiners report

These questions proved to be too easy.

Which always contains carbon, hydrogen and oxygen?

I. Carbohydrate

II. Protein

III. Fat

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

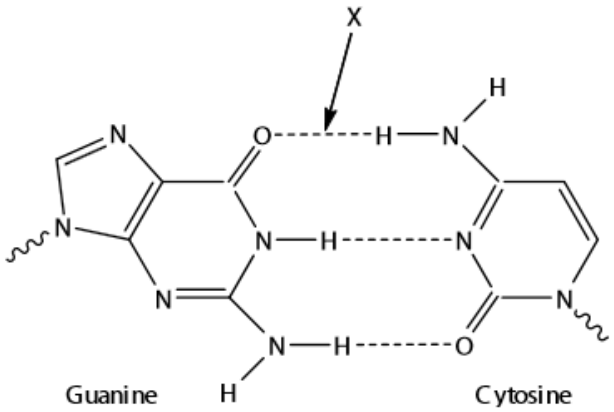
Markscheme

D

Examiners report

Usually candidates do not answer multiple completion questions well, but in this case, more than 60% of the candidates were able to answer it correctly and the discrimination index was high.

What type of bond is labelled X?



A. Ionic
B. Peptide
C. Covalent
D. Hydrogen

Markscheme

D

Examiners report

N/A

What happens during glycolysis for one molecule of glucose?

A. Two pyruvates are formed.
B. There is a net gain of two NADPH + H^+.
C. There is a net loss of two ATP.
D. Two acetyl CoA are formed.

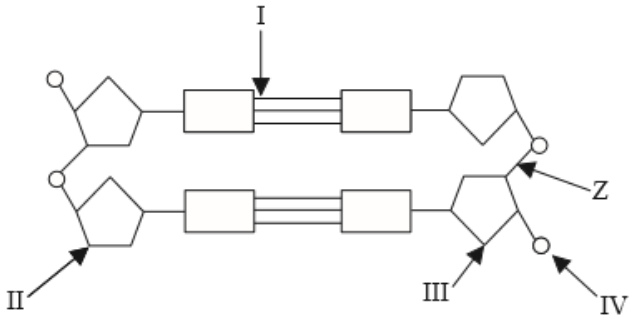
Markscheme

A

Examiners report

This question was too easy for most candidates.

This question refers to the following DNA diagram.



What type of bond does Z represent?

A. Covalent bond
B. Hydrogen bond
C. Peptide bond
D. Semi-conservative bond

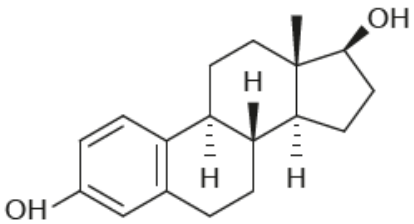
Markscheme

A

Examiners report

N/A

What characteristic shows that this steroid molecule is a lipid?



A. It is made of carbon rings.

B. It has a very low proportion of oxygen to carbon.

C. It contains OH groups as do fatty acids.

D. It is made only of nitrogen, oxygen and hydrogen.

Markscheme

B

Examiners report

[N/A]

Which sequence represents the order of events in protein synthesis?

	Earlier → Later		
A.	small and large subunits of a ribosome are joined	a first tRNA with the amino acid methionine joins the ribosome	the ribosome reaches a stop codon
B.	an amino acid binds to tRNA	the tRNA moves from a binding site to another binding site on the ribosome	the ribosome reaches a stop codon
C.	an amino acid binds to mRNA	a peptide bond is made between the amino acids	the tRNA moves from a binding site to another binding site on the ribosome
D.	the tRNA moves from a binding site to another binding site on the ribosome	a peptide bond is made between the amino acids	the anticodon of a mRNA pairs with the tRNA

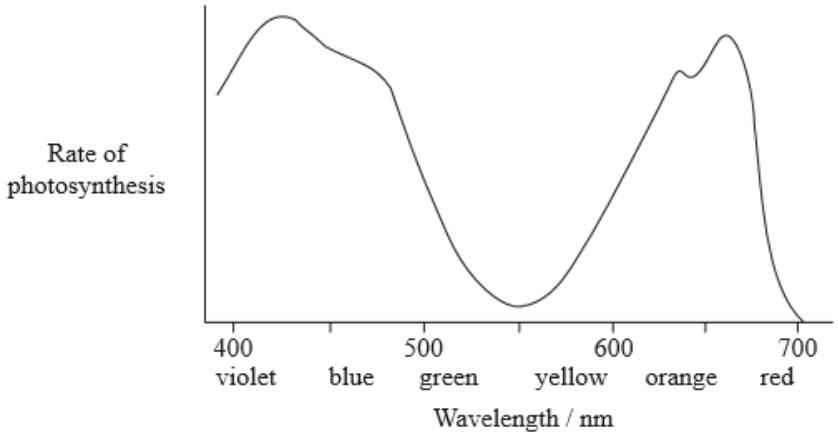
Markscheme

B

Examiners report

This question was complex, because the events were not really in a sequence, therefore confusing candidates. Although A was a popular answer, the ribosome's subunits join after the tRNA joins the methionine, therefore this is not the correct answer.

What conclusion can be drawn from examining the action spectrum for a green plant shown below?



A. Yellow light is the most effective at promoting photosynthesis.
B. Every colour of light is equally effective at promoting photosynthesis.
C. Light of wavelength 550 nm is least effective at promoting photosynthesis.
D. Light in the green range is the most effective at promoting photosynthesis.

Markscheme

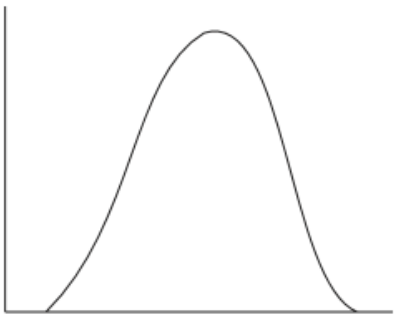
C

Examiners report

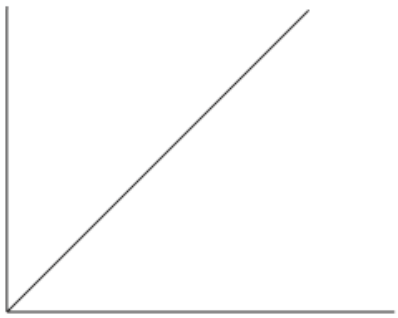
This question proved to be too easy, as almost all candidates answered correctly.

Which graph shows the effect of increasing substrate concentration on enzyme activity?

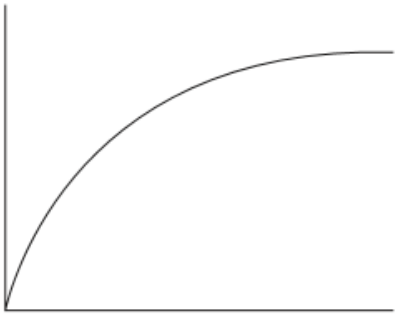
A.



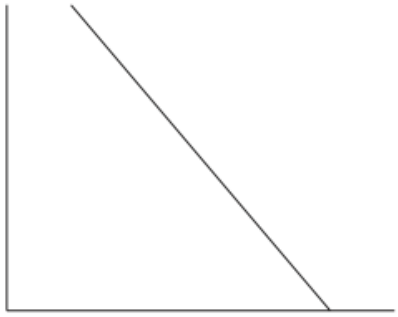
B.



C.



D.



Markscheme

C

Examiners report

Questions 7, 8, 10, 11 and 12 also had relatively low discrimination indices because a high proportion of candidates answered them correctly, indicating either good knowledge or that these questions proved to be rather too easy.

What is a consequence of the specific heat capacity for liquid water, ice and water vapour?

State	Specific heat capacity / $kJ\,kg^{-1}\,K^{-1}$
liquid water	4.187
ice	2.108
water vapour	1.996

A. Less energy is needed to warm water vapour than liquid water.
B. Salt dissolves more readily in liquid water than in ice.
C. Small insects can walk on liquid water.
D. Ice floats on liquid water.

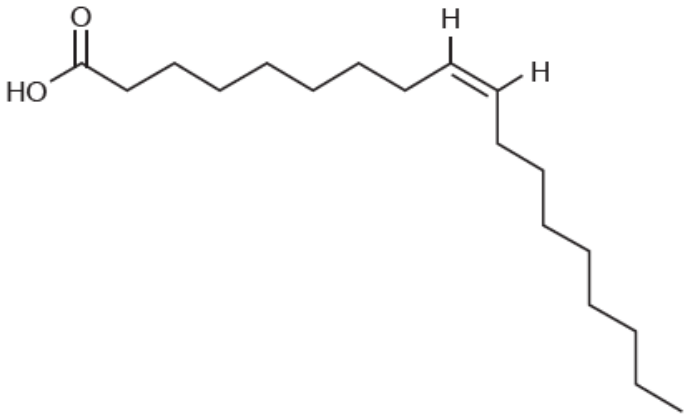
Markscheme

A

Examiners report

Although there have been comments on the difficulty of this question, it really turned out to be very easy and most candidates got it right.

What type of molecule is shown in this diagram?



A. Trans saturated fatty acid

B. Cis unsaturated fatty acid

C. Cis saturated fatty acid

D. Trans unsaturated fatty acid

Markscheme

B

Examiners report

[N/A]

The table below shows the codons that determine different amino acids in protein translation.

First base in codon	Second base in codon				Third base in codon
	U	C	A	G	
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	—	—	A
	Leu	Ser	—	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

What is the sequence of the amino acids that is being translated from the following mRNA sequence?

5' AUGGGUGCUUAUUGGUAA 3'

A. Met-Pro-Arg-Ile-Thr
B. Met-Cys-Ser-Tyr-Trp
C. Met-Gly-Ala-Tyr-Trp
D. Met-Gly-Tyr-Ala-Thr

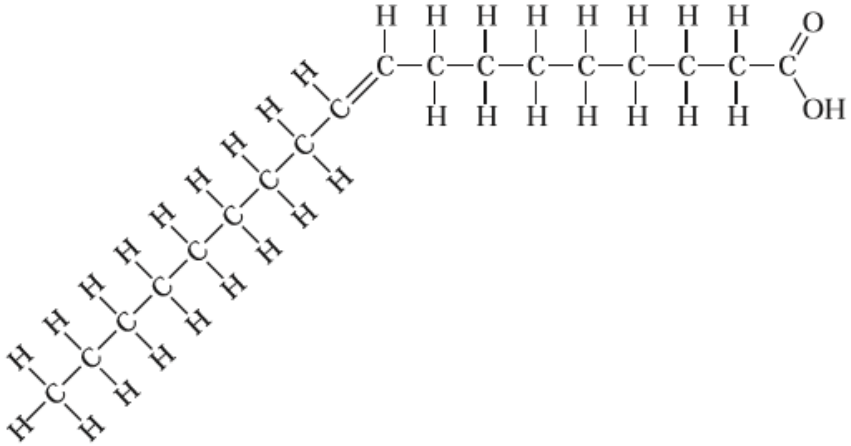
Markscheme

C

Examiners report

N/A

Which chemical is shown in the diagram below?



A. Monosaccharide
B. Triglyceride
C. Fatty acid
D. Amino acid

Markscheme

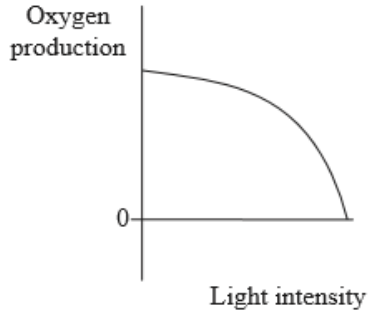
C

Examiners report

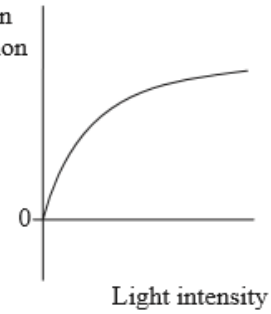
N/A

Which of the following graphs represents the effect of changing light intensity on the rate of oxygen production by a green plant?

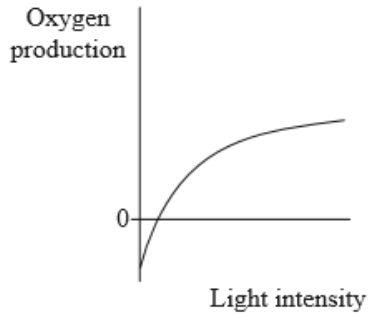
A.



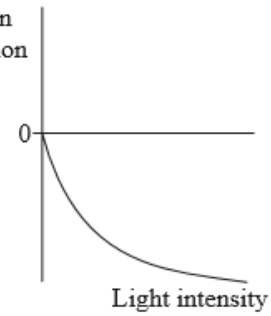
B.



C.



D.



Markscheme

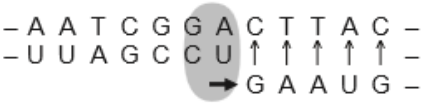
C

Examiners report

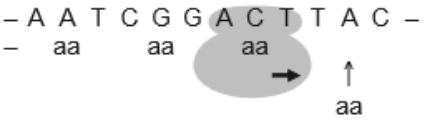
Although the examiners agreed this is a good question, it turned out to be a bad discriminator, as most candidates considered B to be the correct answer. Many candidates failed to realize that there is a negative production of oxygen when there is no light as it is consumed in respiration.

Which model represents transcription?

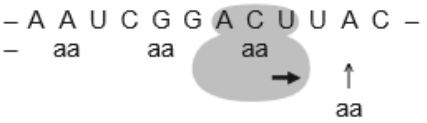
A.



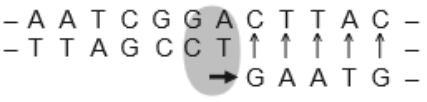
B.

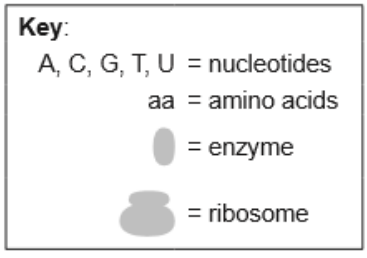


C.



D.





[Source: © International Baccalaureate Organization 2015]

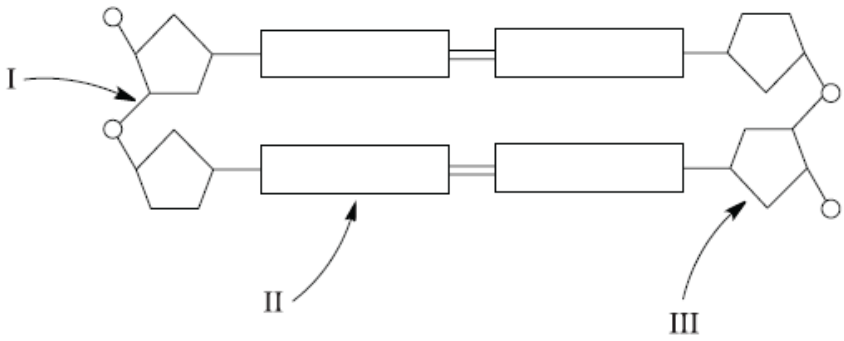
Markscheme

A

Examiners report

This question turned out to be an easy question, although some candidates confused the answer with the translation process.

The diagram below represents part of the DNA molecule.



What are the parts labelled I, II and III?

	I	II	III
A.	hydrogen bond	base	deoxyribose
B.	hydrogen bond	deoxyribose	phosphate group
C.	covalent bond	base	deoxyribose
D.	covalent bond	deoxyribose	phosphate group

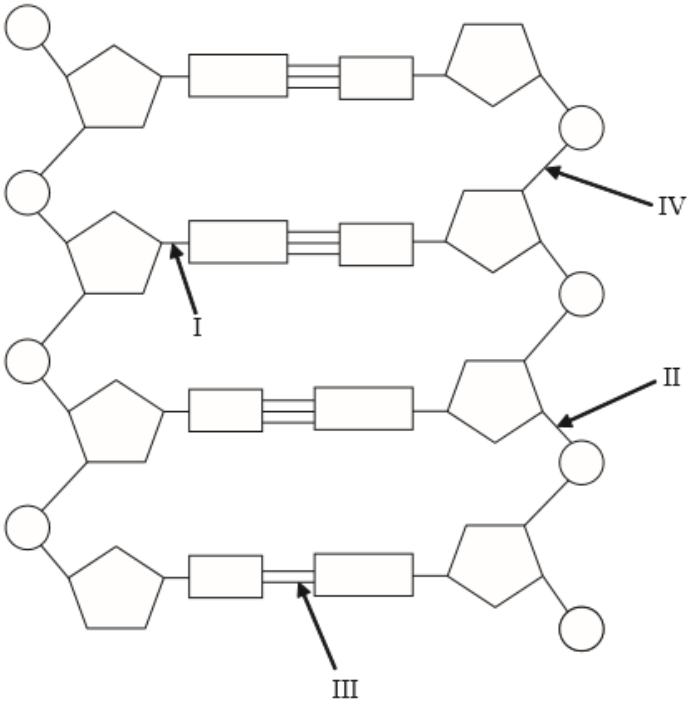
Markscheme

C

Examiners report

[N/A]

In the model of the DNA molecule shown below, which arrows point to covalent bonds?



A. I, II and III only
B. II, III and IV only
C. I, III and IV only
D. I, II and IV only

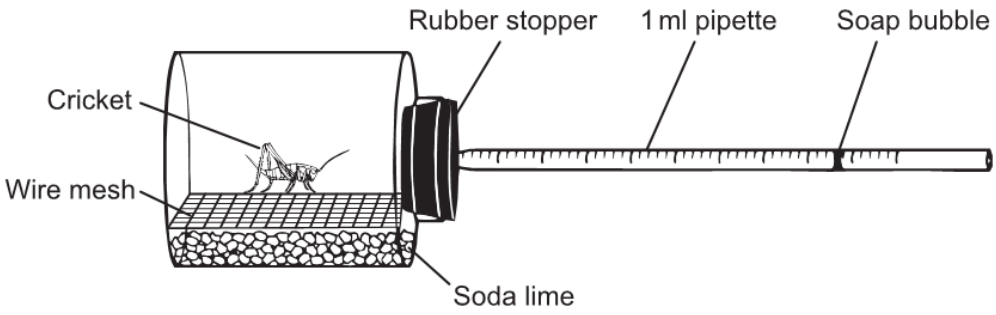
Markscheme

D

Examiners report

N/A

A cricket was placed in a respirometer at constant temperature for ten minutes. The soap bubble moved along the pipette.



[Source: © International Baccalaureate Organization 2017]

What was measured by the movement of the soap bubble?

A. Production of carbon dioxide

B. Volume of excretory products

C. Oxygen consumption

D. Release of heat

Markscheme

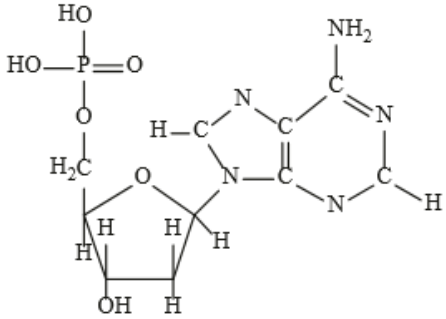
C

Examiners report

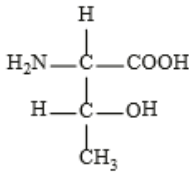
[N/A]

Which molecules show a monosaccharide and a fatty acid?

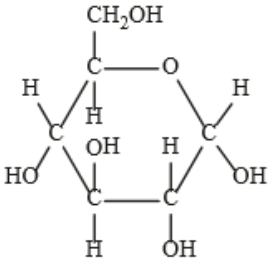
Molecule 1



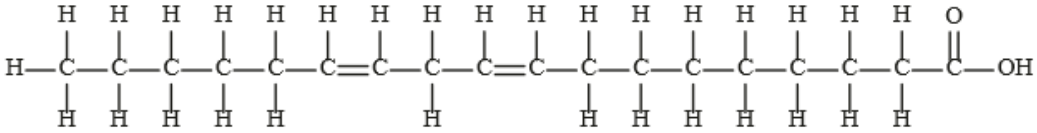
Molecule 2



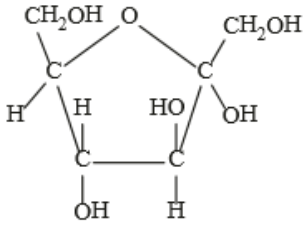
Molecule 3



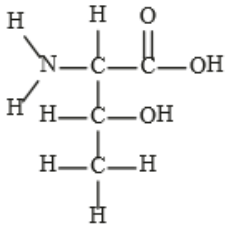
Molecule 4



Molecule 5



Molecule 6



	Monosaccharide	Fatty acid
A.	1, 3 and 5 only	2, 4 and 6 only
B.	1 only	2 and 6 only
C.	3 only	2 and 6 only
D.	3 and 5 only	4 only

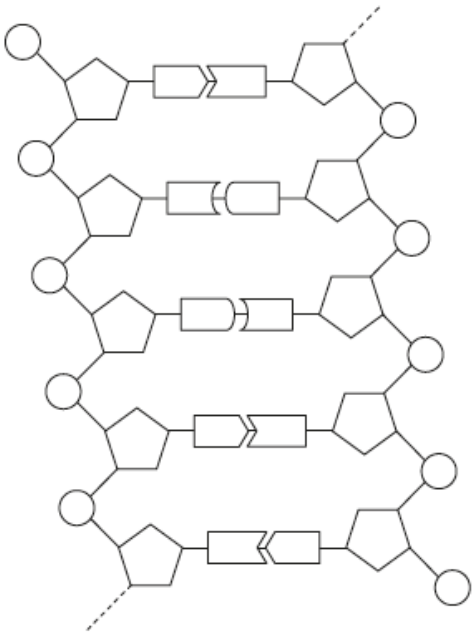
Markscheme

D

Examiners report

N/A

What is correct for the DNA double helix?



	Deoxyribose bonds to a …	Hydrogen bonds form the bond between the …	Complementary base pairing between …
A.	phosphate and a base	phosphates and the bases	adenine and uracil
B.	deoxyribose and a phosphate	deoxyribose molecules	thymine and guanine
C.	base and a deoxyribose	phosphate and the deoxyribose	adenine and thymine
D.	base and a phosphate	bases	cytosine and guanine

Markscheme

D

Examiners report

[N/A]

A strand of mRNA consists of the following nucleotides:

AUUCUGGCUA

Which of the following represents the non-transcribed (sense) strand of the DNA?

A. TAAGACCGAT

B. ATTCTGGCTA

C. UAAGACCAU

D. AUUCUGGCUA

Markscheme

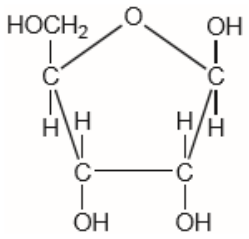
B

Examiners report

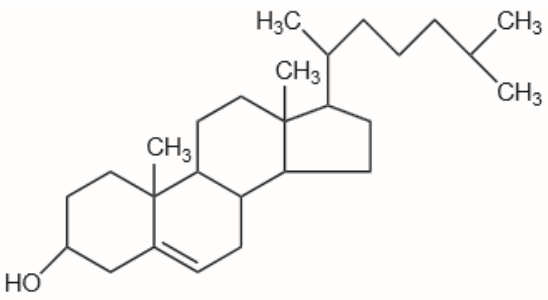
[N/A]

Which molecule is a sugar?

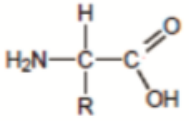
A.



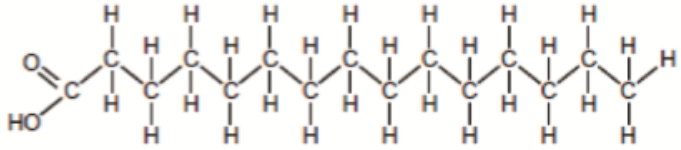
B.



C.



D.



Markscheme

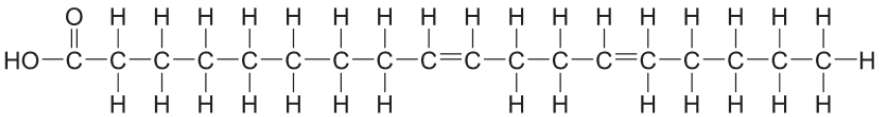
A

Examiners report

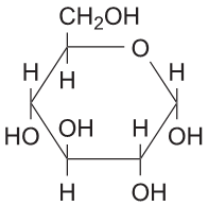
This question was too easy, as 90% of the candidates correctly answered this question, easily recognising the molecule of a sugar. Some of the other structures were not of real molecules and in retrospect, this should not have happened.

Which of the molecules contain peptide bonds or are sugar molecules?

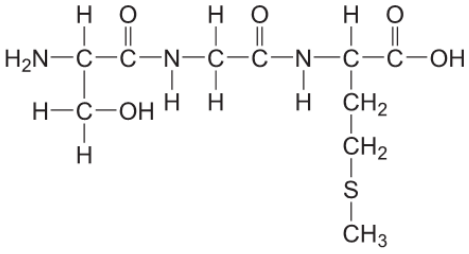
I.



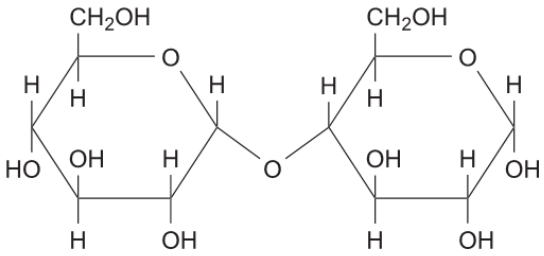
II.



III.



IV.



	Contain peptide bonds	Are sugar molecules
A.	I, III	II
B.	III	II, IV
C.	I, III, IV	II
D.	I	III, IV

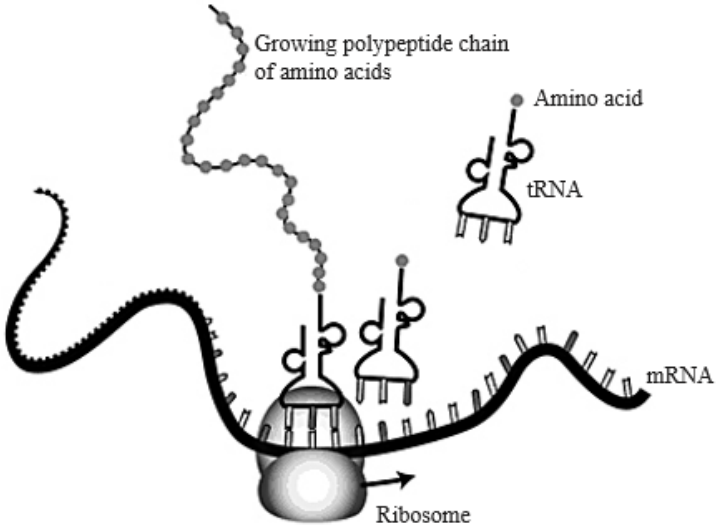
Markscheme

B

Examiners report

[N/A]

The diagram shows the translation of a mRNA molecule.



[Source: National Human Genome Research Institute]

A tRNA molecule with anticodon CAG carries the amino acid phenylalanine. Which codon of mRNA will the tRNA join?

A. CTG
B. CAG
C. GTC
D. GUC

Markscheme

D

Examiners report

N/A

Which equation shows a chemical reaction that occurs during anaerobic cell respiration?

A. pyruvate → lactate

B. pyruvate → lactate (ADP → ATP)

C. pyruvate → lactate + CO_2

D. pyruvate → ethanol + ATP

Markscheme

A

Examiners report

Surprisingly this turned out to be the most difficult question in the exam. There were an equal number of candidates choosing options A, B and C.

Many good candidates got the correct answer.